Manual

For Snuffer 45-90/N & 45-130/N Compressed Air Foam Systems

T3 SAFETY RENTALS LTD

Snuffer Operator & Maintenance Manual CONTENTS

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Safety Information for Snuffer C.A.F.S.

Be sure to read and understand this manual and the Engine manual (if so equipped) before operating the Snuffer to ensure safe operation.

The Snuffer compressed air foam system is a highly versatile fire protection and suppression device and is the system of the twenty-first century.

NOTE: This owner's manual should be read before any use or maintenance of the Snuffer is carried out. This manual should be reviewed periodically to keep familiar with all functions. In addition to this, frequent training should be attended.

If you don't read this, you could:

1. Cause harm to yourself or co-workers.
2. Cause harm to the public.
3. Cause harm to the Snuffer or accessories therefore voiding warranties.

WARNING

The Snuffer is an industrial compressed air foam system and should be operated with great care to ensure accidents are avoided. A qualified instructor in the proper operation of this equipment should train operators of the Snuffer.

This manual must stay with the Snuffer at all times.

Important! The serial number of your unit is on the back of the front panel. Please record this number along with the unit's model number in the space below. Please refer to your model number when you call your distributor or The SNUFFER Corporation, for information, parts and service.

Model Number	Serial Number	Purchase Date

Safety Information for Snuffer C.A.F.S.

This safety alert symbol means **Attention! Become Alert! Your safety is involved!**

The safety alert symbol identifies important safety messages on the Snuffer and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

WHY IS SAFETY IMPORTANT TO YOU?

1. Accidents disable and kill.
2. Accident cost.
3. Accidents can be avoided.

SIGNAL WORDS:

Note the use of the signal words DANGER, WARNING, and CAUTION with the safety message. The appropriate signal word for each has been selected using the following guidelines:

DANGER An immediate and specific hazard that **will** result in severe personal injury or death if the proper precautions are not taken.

WARNING A specific hazard or unsafe practice, which **could** result in severe personal injury or death if proper precautions are not taken.

CAUTION Unsafe practices which **could** result in personal injury if the proper precautions are not taken, or as a reminder of good safety practices.

Snuffer C.A.F. Applications

Compressed Air Foam – Low expansion/high energy foam

The Snuffer, with the Chemical Injector and Air Compressor ON, makes low expansion/highenergy (high-density) foam known as C.A.F. The operator can make several different low expansion foams by changing the Flow Control from the Wet to Dry position and by operating with the smooth bore tip on or off. This will produce foam from a slurry for fighting fires to dry foam for fire prevention. Used in this manner, the Snuffer can be utilized for most fire fighting and fire prevention applications, except in restricted areas where only water is allowed to fight fires. The results are that the fire is suppressed faster; there is a significant reduction in the quantity of water required; there is less water damage and less pollution. Foam injection rates are low 0.2 to 0.4%, 0.2% injection rate is equivalent to 2 gallons of foam chemical mixed in with1000 gal of water.

C.A.F. foam can provide much better structural protection than what is obtainable with the use of plain water or aspirated foam (low expansion/ low energy). The dry foam that is produced by C.A.F.S. is like shaving cream, as shown below and will stick to vertical and overhead surfaces.

Compressed Air Foam Theory

The tiny bubble structure in C.A.F. it is much effective than aspirated foam in extinguishing fires and protecting exposures. Compressed air foam will stick to walls and ceilings, holding the water in contact with the fuel. When using plain water, 90 to 95% of the water ends up on the floor. In general C.A.F. is 7 to 15 times better in fire suppression as compared to plain water and up to 20 times more effective on overhead surfaces.

Class A foam is 15 to 30 times more effective than plain water in extinguishing petroleum fires (Class A foam should not be used on petroleum fires where rescue is involved). Tire fires are easily controlled with an initial wet foam application followed by a dry foam application. Class A, AB, B, and ABD foams are all made more effective when applied as compressed air foam.

Aspirated Foam – Medium to high expansion foam

The Snuffer, with the Chemical Injector ON and the Air Compressor OFF, will allow the operator to use medium to high expansion (low density/low energy) aspirating devices for fire control and prevention. Foam rates are generally 0.5 to 1.0% for Class “A” and 1.0% for Class “B”.

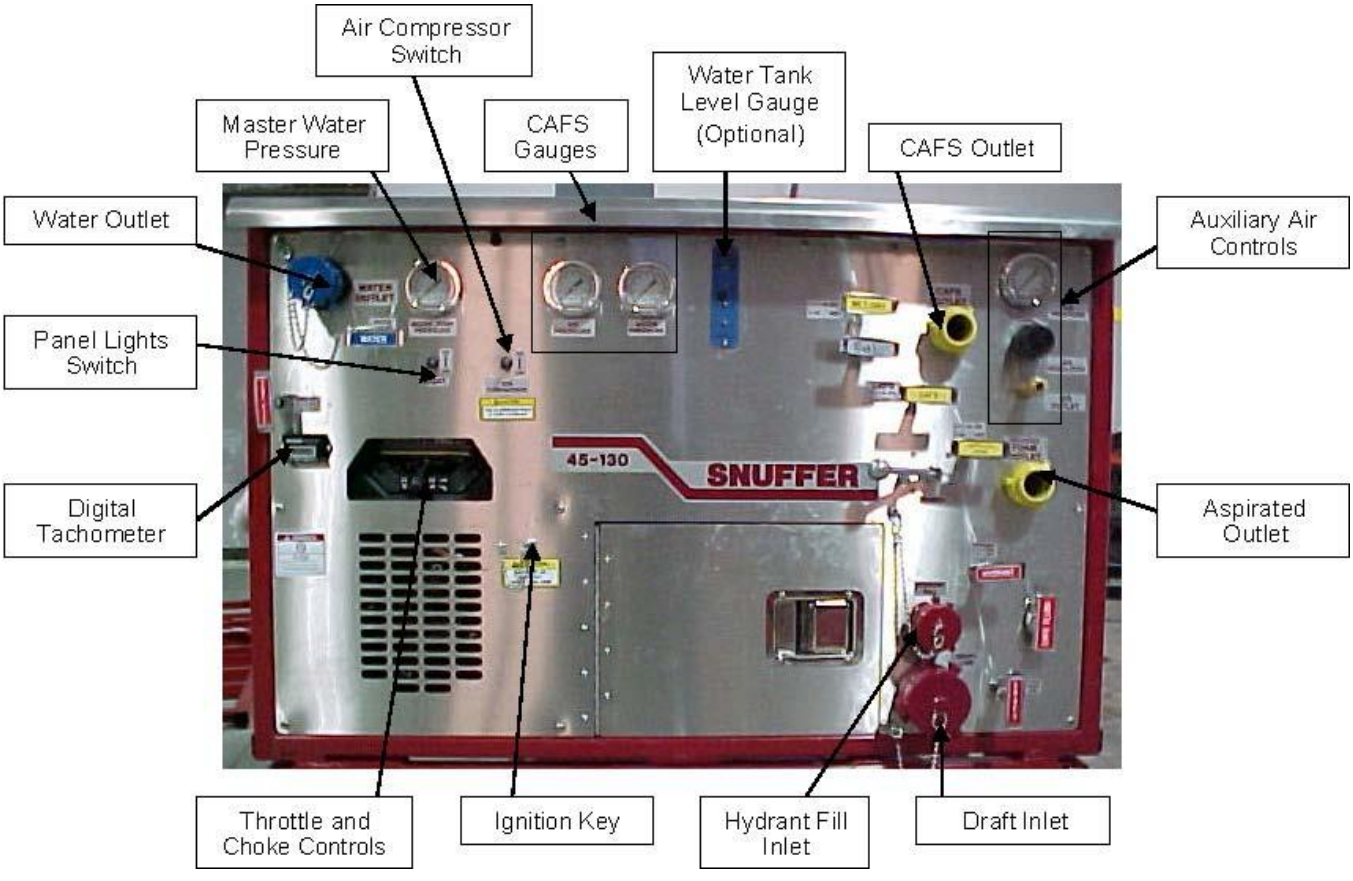
Aspirated Foam Outlet

A aspirated foam system is optional on the 45-90 system, if not orded at the time of purchase the systems can still be added in at a later time. The aspirated foam systems is standard on the 45-130 systems.

A aspirated foam systems is **NOT** available on the 45-90N and 45-130N systems, and can not be added into the system at a later time. A remote system can be added on a truck and connected to the Snuffer systems.

With a aspirated system, you will find the same hydraulic injector as used in the Compressed Air Foam System. The difference between the C.A.F.S. and aspirated system, is that the air is introduced into the water stream at the nozzle. This creates big, medium and some small bubbles in the foam structure. Aspirated foam is technically known as low expansion, low energy foam. Medium expansion and high expansion generators can also be installed at the end of the foam line. Water travels through a self-cleaning filter and then to the hydraulic injector. From there the solution travels down the hand lines and to the aspirated nozzle where air is introduced into the water stream. This foam system has about 100% better cooling and 2 to 4 times the knock down ability of water.

Operator's Controls



Decal Locations on the Snuffer

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Warning Rotating Parts

This decal is located on the inside of the access door of the Snuffer.

This decal is designed to warn of the hazard of the Drive Belts for both the Air Compressor and the Water Pump. Hands, loose clothing or anything else may become entangled in the Belt while the Snuffer is in operation and can cause severe injury or death.

Snuffer 45-90/N & 45-130/N
Compressed Air Foam System

Principals of Operation

When the engine is started, water from the pump flows through a check valve and then is divided into a plain water circuit and one foam circuits. The water in the foam circuit flows through a self-cleaning filter and into a Compressed Air Foam line, and into an Aspirated Foam line(optional). The water is then restricted per line by use of line restrictors that limit the flow through each injector to 40 to 45 gpm (average 45 gpm). Water then flows through the water driven (hydraulic) foam injector(s). The water flow in the injector pushes a large piston assembly up and down, achieved by two sets of reversing valves opening and closing in sequence. Each time the large piston moves upwards, a smaller piston connected to the main piston assembly draws the foam concentrate from a pail or tank and forces it into the center of the water stream. This is now called a foam solution. In the Compressed Air Foam line, with the air compressor switch “ON” compressed air is injected into the foam solution with secondary agitation accomplished by a stationary mixer. In the Aspirated foam line, the foam solution runs as is through the line to the hand line nozzle where air is then introduce into the foam solution by an aspirating nozzle.

Operating Suggestions

The fire fighter quickly learns the best way to use CAFS foam types to their best advantages.

Initial structural fire suppression (fibrous materials). Wet foam WET/DRY valve open, with a 0.88” (22mm) or a 1.06” (27mm) tip on. Inside structures (petroleum fires, rubber and car fires). Medium foam WET/DRY valve open, with tip off Grass and fibrous material fires Wet foam WET/DRY valve open, with a 0.75“ (20mm) tip on.

Protection and final mop-up of automobile, petroleum oil and gasoline fires.
Extra Dry foam WET/DRY valve in “DRY” position, with tip off.

Certain units are equipped with an extra wet foam attachment for grass fire control, thus generally smaller diameter tips, such as 0.50“ (13mm) or 0.75“ (20mm) should be used.

NOTE: 1.00” (25mm) hand lines are not recommended for use on structural fires.
NOTE: Fire fighters report that they often obtain better knock down of most petroleum fires by lobbing on the foam.

Hoses

Standard 1.50” (38 mm) hose should be used on each Compressed Air Foam outlet, except for inside structural attack.

For inside structural attack, it is highly recommended that at least 50 ft. (15 m) of crimp resistant hose be connected to the pistol grip valve.

A regular single or double-jacketed hose filled with compressed air foam can be crimped because of the low operating pressures, resulting in loss of flow. Weeping forestry hoses are not recommended as this allows the air to escape, which reduces the effectiveness of the foam and discharge distance.

To make good Compressed Air Foam it is recommended that 150 ft. (45m) of 1.50” (38mm) hose or 200 ft. (60m) of 1.75” (45mm) hose be used. The hose should have a rough bore to maximize mixing of the air and foam solution. This will result in the most uniform bubble structure, giving the highest quality and most effective foam. Smooth wall hose will work but it takes greater lengths to accomplish the same scrubbing action within the air and foam solution.

Operators often use compressed air for 10-15 seconds to flush out hand lines after they have run water through these lines. This is very beneficial for cold weather clean up operations.

NOTE: 1.00” (25mm) hand lines are **not recommended for structural** fires but they can be used for wild land mop up operations.

Recommended Hoses

1.50” (38mm) Line

- 150 ft. (45m) of single or double jacket fire hose is recommended (non weeping).
- Standard hose 1.50” (38mm) or 1.75” (45mm)

Interior Attack hose

- ❿ 1.50” (38mm) Neidner non-crimping (50 ft. (15m) minimum). This hose is recommended for interior attacks as it does not kink passing through doors, up stairs.

Nozzles & Valves

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This decal is located on the back of the Control Panel.

Unit Serial #:

It is very important to understand when and how these settings should be used. When Compressed Air Foam is being applied the fire fighter can open and close the valve quickly without fear of causing water hammer.

Recommended Nozzle or tip sizes for 1.50" (38mm) C.A.F. lines are:

- 0.75" (19mm) Straight Bore Nozzle
- 0.88" (22mm) Straight Bore Nozzle
- 1.06" (27mm) Straight Bore Nozzle
- Akron Saberjet (or equivalent) fog/straight stream nozzle/valve. (This nozzle cannot produce dry foam)

Aspirated Foam Tips & Nozzles

The Aspirated Foam System comes standard with a 2:20 adjustable nozzle for best performance. It can also be used with a combination fog and stream nozzle. However this nozzle, in most fire situations, is not as effective at making useful foam.

The nozzle valve must always be opened or closed slowly to reduce water hammer.

FOAM

Making good quality foam is not hard to do, but it does require some study, training and practice. It is necessary for fire fighters to learn how to read foam type and how it is applied to various surfaces and fires.

Class A Foam

Use a good quality foam chemical that is tolerant to the cold if used with water at temperatures below 12°C (55°F).

With water at temperatures above 12°C (55°F) the chemical should make good wet foam when the chemical injector is set at 0.2% and good dry foam at 0.3% injection rate. In cold temperatures you may have to increase the foam percentage by 1/10 of a percent to achieve the same quality foam. Very dry foam, that makes “snow flakes”, is not desirable, as it does not contain enough water to give adequate protection. When using different brands of foam, become familiar with their properties, when used in the Snuffer and before using it at an actual fire. It’s important to remember that higher chemical rates are not better. In most cases a higher rate produces thicker foam, which will not run into fibrous material, crevices, and the foam becomes less effective.

Class B Foam (AFFF)

Use a good 1.0% AFFF set at 0.6% injection rate for non-rescue, and 1.0% injection rate for rescue situations. Application of AFFF compressed air foam approximately doubles the effectiveness when knocking down fires as compared to water driven stream enductor or injector systems. This is due to the uniform tiny bubble structure that the Compressed Air Foam System produces. The A & B foams used by the department should be tested to make sure they are compatible.

Other Foams

Certain ABD foams can also be used effectively to cut off three-dimensional fires and certain metals, such as solid magnesium, titanium shavings.

CAUTION: It is important that fire departments are trained well on any particular foam that they are using. They must make sure that when changing to a new brand of foam it is tested for compatibility with other foams used by the department, and that adequate training takes place.

Foam types Suggested uses for the five types of Compressed Air Foam.

This chart shows recommended nozzle/tip sizes and what type of foam is produced when the system is set to the “DRY” or “WET” position, along with either the Nozzle/tip “ON” or “OFF” the hand line valve.

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Dry Foam 20 to 25 gpm (64 L/min).

1. **Dry Foam** 10-12 times expansion.
   - Produces 250-300 gpm (950-1140 L/min) of Dry foam (25 gallons (95 L) of water).
   - Protection mop up on structural fires, after a fire has been knocked down.
2. **Extra Dry** Foam 12-15 times expansion.
   - Produces 250-375 gpm (1140-1420 L/min) of Extra Dry foam (25 gallons (95 L) of water).
   - Used to put an extra layer of foam inside a car or inside house walls, and for long-term exposure protection.

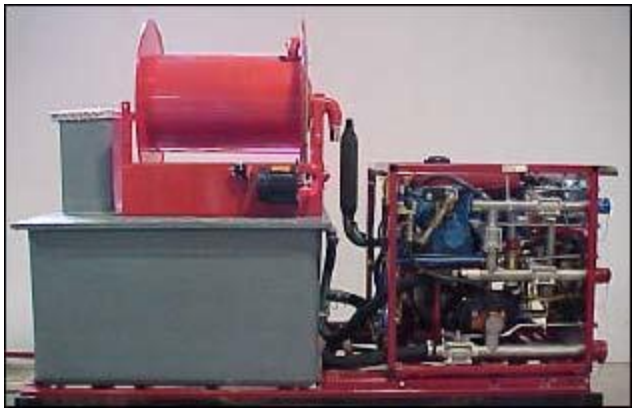
Wet Foam 40 to 50 gpm (160 L/min).

3. **Wet Foam** 3-4 times expansion.
   - Produces 150-200 gpm (570-750 L/min) of Wet foam (50 gallons (160 L) of water).
   - Often used for grass fire control. Occasionally on external structure fires, where extra casting distance is required - not as effective as medium foam.
4. **Medium Foam** 8-9 times expansion.
   - Produces 400-450 gpm (1515-1700 L/min) of Medium foam (50 gallon (160 L) of water).
   - Used on more than 90% of fires that departments come in contact with (structural, industrial, rubber, automobile, petroleum and synthetic materials). It also does a good job of providing protection.

Extra-Wet Foam 80-100 gpm (300-380 L/min).

5. **Extra Wet Foam** 1-2 times expansion.
   - Produces 90-180 gpm (340-680 L/min) of Extra Wet foam (90 gallons (340 L) of water).
   - Used on grass fires and often-used on materials, garbage dumps deep-seated fires in fibrous the foam or container fires.

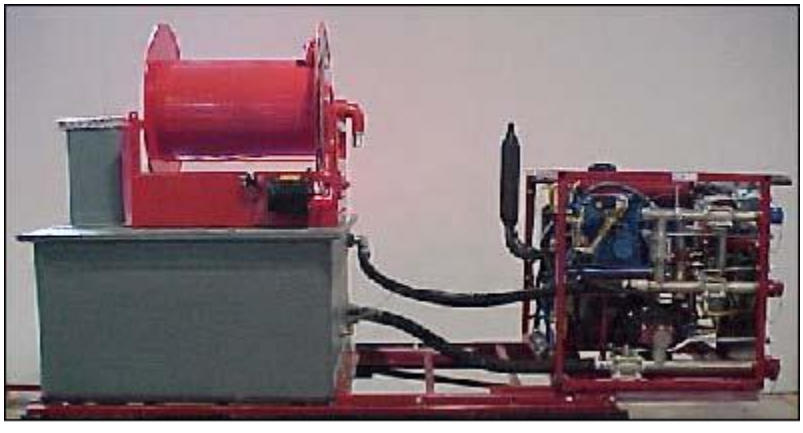
Installation



When the Snuffer is combined with a water tank on a truck with enclosure the following is recommended:

1. The system should be installed onto a Rollout skid frame for easy maintenance and servicing.

2. In order to allow the Snuffer to move in and out on the Rollout skid frame, sufficient hose lengths must be provided to prevent crimping.



3. A water tank level gauge should be installed.

4. For greater operator convenience the Snuffer systems should be equipped with a 1.50” (38mm) Hydrant Fill line, this line will allow the

operator to fill the water tank using a external pump source.

NOTE: A Tank fill valve can also be installed. This allows the operator to fill the water tank by using the Snuffer pump.

Gasoline Engine Preparation

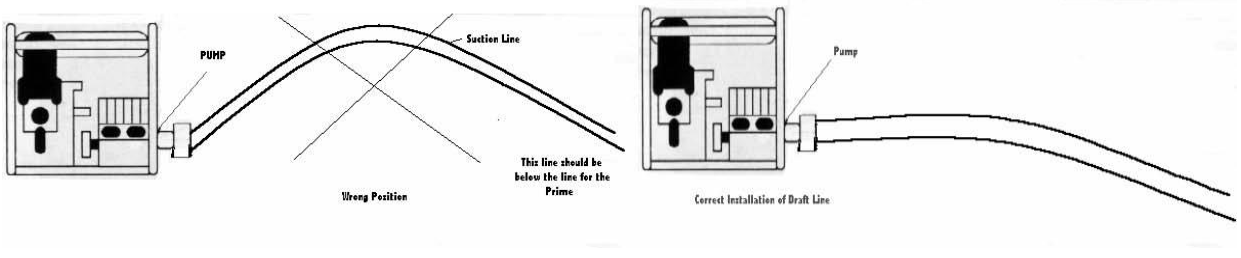
Fuel line can be taken directly from the truck's fuel tank as long as a small electric fuel pump is installed, or the unit can be equipped with a marine type, portable fuel tank with quick connectors. Position the tank away from the engine in a well-ventilated area..

Before Starting

Check the engine, and air compressor oil levels.

A. For water tank equipped systems, make sure the valve is open to draft from an external source of water or from the tank.

B. Use a draft line 2.50" (64mm) or larger that is equipped with a reliable Suction Strainer. Make sure that the suction line has a smooth gentle curve down to the water source. The draft line should never curve upward and then down to the pump, as it may cause air locks.



C. Foam chemical lines should be connected and foam foot valves fully inserted into the respective pails or tanks.

F. Make sure that all drain cocks and drains are closed.

D. Connect foam and water hand lines. A 1.50" (38mm) hose is recommended and should be attached to each outlet being used.

Starting the Snuffer Unit

A. Start the engine (**making sure that the air compressor switch is in the OFF position**). Move the choke lever to full open then turn the key to the start position (throttle at approximately one third open). When the engine starts, check to make sure water pressure is showing on the water gauge.

B. If water pressure is not showing:

When a unit is equipped with a draft line and occasionally from an onboard water tank, operate the air primer by opening the air primer valve until water is visible at the air primer outlet. When water pressure just starts to show on the gauges, shut off the primer valve. Water pressure should stay showing on the water gauge with discharge valve(s) closed (static). If after 20-30 seconds the water pressure continues to drop, shut the unit down and check suction hose connections for leaks, etc. Then go through the priming sequence

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C. With the Snuffer running and water pressure showing, increase the engine rpm. The water pressure should be between 130 and 140 psi.

C.A.F.S. Combining Valve

The 45-90 and 45-130 systems can be equipped with a optional C.A.F. combining valve. This valve allows the operator to combine the two foam line (C.A.F. and Aspirated foams) into one line. Keep in mind that in the Aspirated line there is only a foam solution, so what is being added to the C.A.F. line is more foam solution and water, thus increasing the casting distance of the foam.

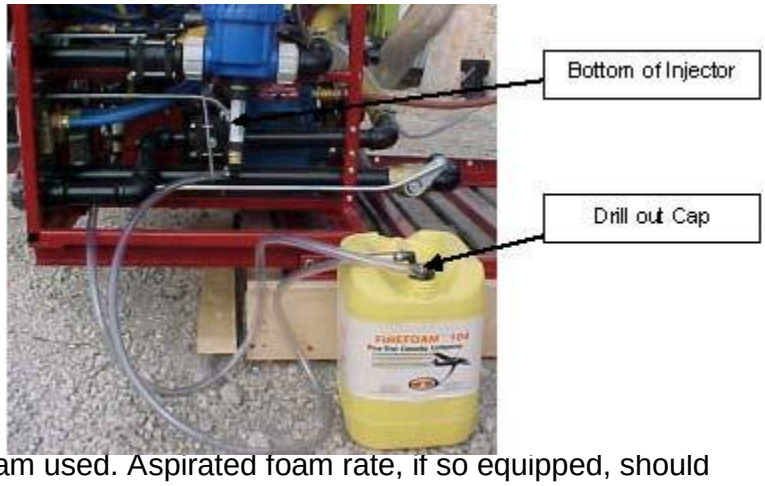
Hydraulic Foam Injectors

The foam injector works in the following manner. When a hand line valve is opened, water flows into the hydraulic injector, which acts on a large and small piston located within the injector bell housing. A set of reversing valves is used to allow the pistons to move up and down. Every time the large pistons move upwards, the small piston pulls chemical from the pail or tank. The foam chemical is then injected into the center of the water stream for better mixing. This unit operates on water flows of 2 -50 gpms and pressures of 10-120 psi and is capable of lifting foam from a pail or tank located up to 7-9 ft below the injector. Foam tanks or pails should not be located much above the level of the injector as a siphon action may occur if plain water is used through the injector.

The next procedure is to charge the hydraulic foam injection system using the following steps:

A. Connect a container of good foam concentrate. Normally 1.0% A or B, and 0.4% for ABD.

B. Connect the clear plastic line with foot valve, to the bottom of the injector stem. To reduce the chemical from splashing, drill a hole through the cap of the pail the same size as the clear plastic line. Disconnect the line from the foot valve and place the clear line through the cap and re-connect the foot valve.

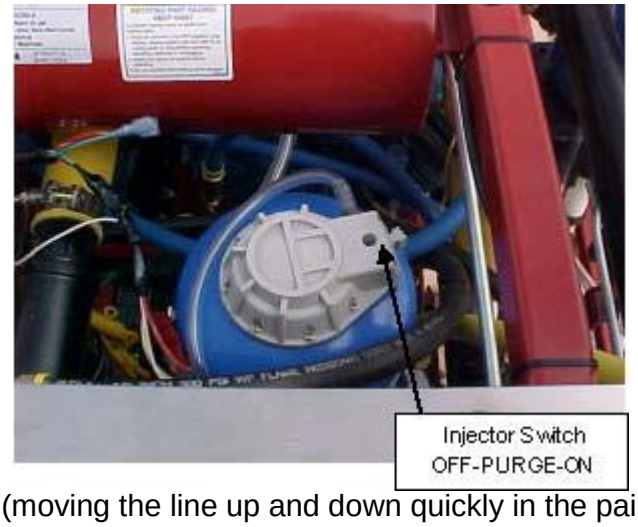


C. Make sure all connections are tight and 0.4% (Class A), depending on the quality of foam used. Aspirated foam rate, if so equipped, should be set at 0.5-1%. This is done by first loosening the collar where the injector stem meets the injector body ½ - 1 turn. Once this is done the injector stem can be turned up or down to adjust the rate. It may be necessary to hold the clear plastic calibration indicators with the other hand. When the desired rate has been selected, lightly hand tighten the collar. In most cases if the collar is set correctly it is not necessary to loosen the collar.

D. Slowly open the desired CAFS line (engine should be set at ¾ throttle or better).

WARNING: Always have someone holding the pistol grip nozzle valve on the end of the line when operating hand lines for any reason.

E. Turn the switch located at the top of each injector to the Bypass ("B") center position for a second and then turn the switch to the ON position. The operator should, after a few seconds, be able to see the chemical flowing through the clear suction tube. If the Injector does not start, turn the switch to the OFF position and repeat the above procedure. It will take a few seconds before you see the foam concentrate moving up the clear plastic line. This process can be sped up somewhat by filling the clear plastic supply line with



foam chemical, this is done by jog priming (moving the line up and down quickly in the pail until the foam is ¾ the way up the line or better). On start up, air slugging (line jerking) in the C.A.F.S. discharge line is normal. The flow will gradually clear up and a smooth foam discharge will occur.
C.A.F.S. discharge distance will greatly increase as the foam solution and air stabilizes.

NOTE: C.A.F.S. air slugs may also occur if the foam rate is too low for the particular foam you are using. An easy way to tell this is to move the rate up 1 or 2 points and if the slugging clears up then the problem was the injection rate. This is especially prevalent when using very cold water or poor quality foam.

An easy way to tell whether the foam setting is correct, after the C.A.F. system is up and running, is to place the Wet/Dry valve in the Dry position and remove the 1 and 1/16th inch tip from the 1 3/8" ID pistol grip ball valve. The system should operate with a minimum of air slugging after ten to 15 seconds. If it does not do so, then the rate needs to be increased slightly. However, remember that more is not better. Use only enough foam chemical to do the job.

NOTE: The CAFS discharge nozzle should be a 1 1/16" straight smooth bore nozzle (not tapered).

F. Repeat this operation for the second C.A.F.S. line.

NOTE: During operation the engine should be run at 2500 to 2600 rpm. This should generate a static pump pressure of 125 to 130 psi.

WARNING; Do not open a discharge valve unless a hose is attached to the related discharge port. Injury may occur if hose is not coupled to the discharge port. **C.A.F. outlets must never be capped.**

Air Regulator

When air tools are used, the air regulator can be used to set their maximum operating pressure (make sure the airline fitting matches the air chuck or connector).

NOTE: You can operate one of the CAFS foam outlets and also the aspirated foam outlet when using the external air chuck.

Snuffer Unit Shut Down (Warm Weather)

1. Reduce engine RPMS by 1/3 and operate for 1-2 minutes.
2. Shut off Engine.

3. Leave the system fully charged with the injector switch in the ON position.

CAUTION: If any adjustments or maintenance is to be performed on the Snuffer unit the procedures must not be performed until all of the system pressure has been relieved. This is achieved by opening the discharge valves **very slowly**. Once the maintenance or repairs have been done, the system must always be tested to make sure that it is making foam, before returning the unit into service.

In very cold weather conditions, if the truck's coolant heater can not keep the Snuffer area warm, it may be necessary to operate the engine (Snuffer system) until the unit is returned to the fire station. However, there must be water in the tank and some water pressure showing on the water gauge to avoid burning out the pump seal.

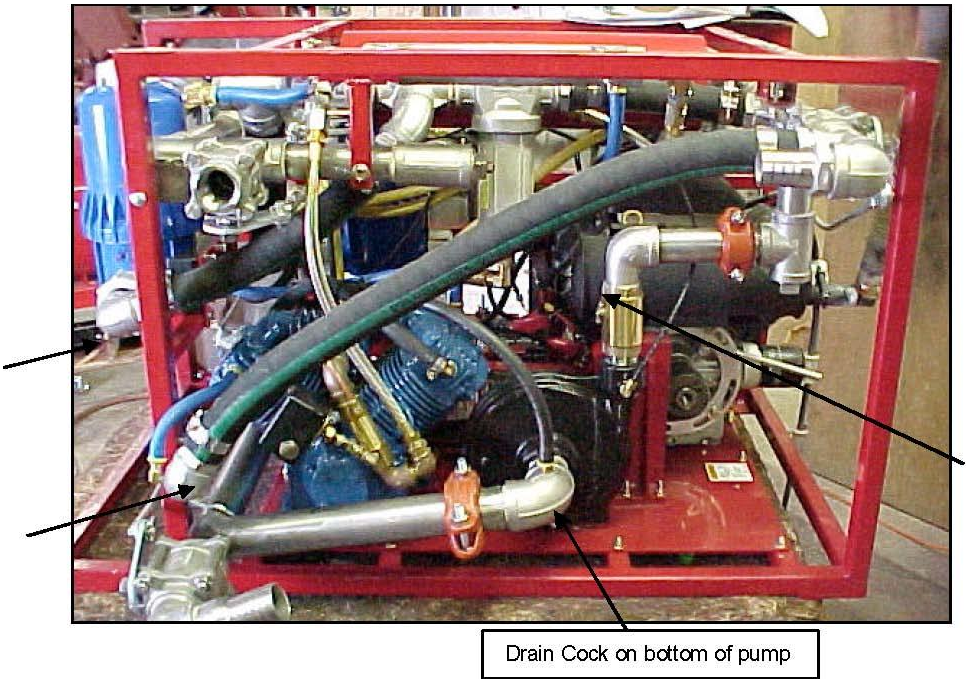
Drain the Unit to Prevent Freeze up or for Storage

If there is a chance of freezing temperatures, it is best to place the unit inside a heated enclosure (self contained or building). Information on self-contained winter enclosures is available from your local dealer.

Before shutting down the unit, and with the ha and lines operating, it is necessary to shut the switch of off at the top of the injectors. In this way the injectors can be p properly

1 **Shut off engine.**
2 **Remove Chemical Suction Line from Hy ydraulic Injector.**
3 **Open CAFS Valve(s) and Plain Water Va alve.**

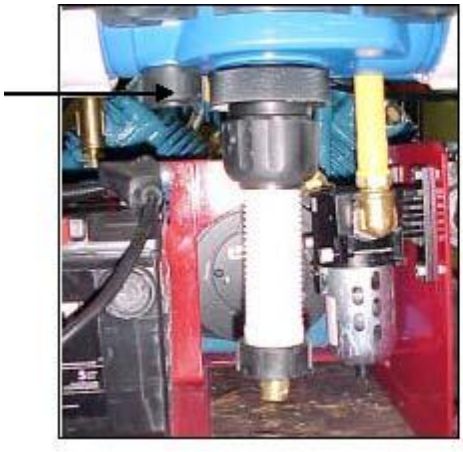
WARNING: System may be under pressu sure. Relieve pressure with great care. 4. Open drain Cocks o valves at the following locations:

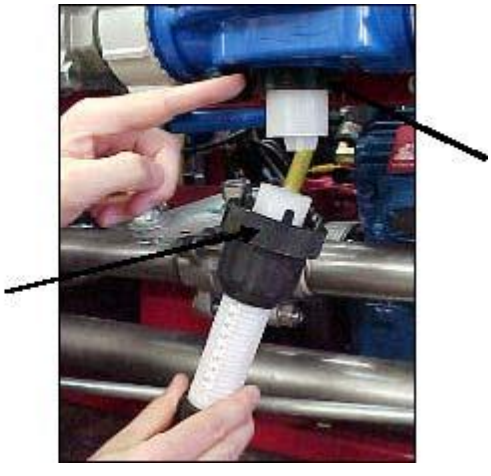


5. Open valve at the bottom of the Water Filter.

6. Remove the Bell Housing from the Hydraulic Injector. Remove the Piston from inside and allow to air dry.

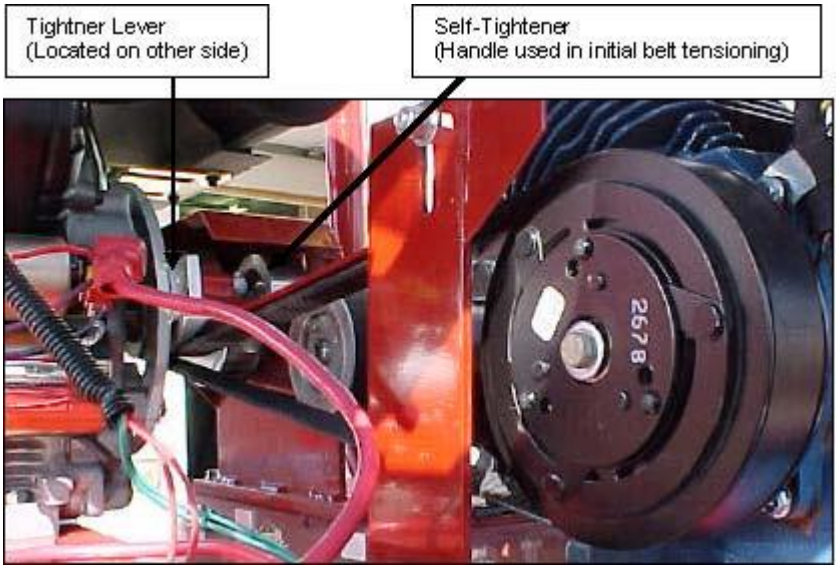
12. Remove the stem from the Injectors. Removed nut on bottom of injector and pull stem out.





Drives & Drive Belts

Air Compressor



The Air Compressor is driven by an automotive style serpentine belt. Tightening the air Compressor as achieved by turning the circle tightener on the engine..

To tighten the Air Compressor drive belt, proceed as follows:

Loosen the three 7/16“ bolts, lift the handle of the circle tigthener until the belt cannot be twisted more than 90° by fingers. Then retighten the three 7/16” bolts.

Water Pump

The 45-90/N systems use a cog type belt to drive the water pump, while the 45-130/N systems use a eagle drive cog belt to drive the water pump.

To tighten the Water Pump drive belt, proceed as follows:

Loosen the Idler Pulley pry down on the pulley and retighten the bolt. The belt should be tightened to a point where there is about 3/8” slack in the under side of the belt. When this is accomplished, secure the bolt on the water pump tightener pulley.

It is necessary to recheck the belt tension after 10 to 20 minutes of operation.

Water Pump & Plumbing

Operation

The Snuffer 45-90/N and 45-130/N systems uses a centrifugal single impeller water pump. A check valve is located above the pump and is a requirement for the operation of the air primer.

Self-Cleaning Filter Maintenance

Water from the pump flows through a self-cleaning filter. This filter should be checked often in the first few hours of operation and periodically to see if the filter is being flushed effectively or not. If the screen is partially plugged clean it in warm water with a toothbrush.

To inspect the filter screen:

A. Shut off the Snuffer unit and release all system pressures.

B. Open the drain valve for the required filter. Disconnect the drain line from the bottom of the filter by pulling back on the collar of the quick disconnect. Slowly unscrew and remove the filter housing.

C. Remove the screen and inspect condition and foreign material build up.

If foreign material builds up is excessive it may mean that the operator is not p
often enough or not allowing enough water to continuously flow out of the valv
the filter body. It should be noted that if rusty or muddy water is used, the val
self-cleaning filter should be opened fully to allow 8 to 10 gpm of water to flow out of the filter for 4 to 5 seconds of operation. This action should keep the filter screen clean. The operator, by removing the filter screen from the canister, can then judge the best purge intervals. With very dirty water it may be necessary to run the filter valve continuously.

NOTE: 1. When reassembling the filter canister **HAND TIGHTEN ONLY**.

2. On disassembly of the filter canister from the body, if the screen is difficult to remove from the canister, it is usually due to foreign material at the base of the screen. If it becomes necessary, the fitting on the bottom of the canister can be placed in a vice and the black stem inside the screen can then be screwed out of the body, which will release the screen.

Hydraulic Injector

Operation

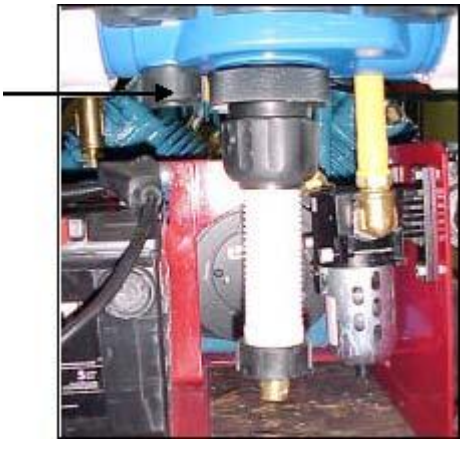
To start the hydraulic injection unit:

A. Place the switch in the center position for a second and then to the ON position

NOTE: The unit should be running above half speed, with the discharge valve open to allow water to run out the line.

B. Foam concentrate is then pulled from the pail or [illegible] operating, check to see that the chemical is moving in t[illegible] moving after 4 or 5 seconds, repeat steps A & B. The foam line can be pre-primed as mentioned previously.

Adjusting foam rate



1 Loosen lock nut slighty.
2 Turn adjustment nut to required percentage.
3 Retighten lock nut.

Injector Maintenance

A. Stop the engine and release all system pressure by opening the discharge valves.

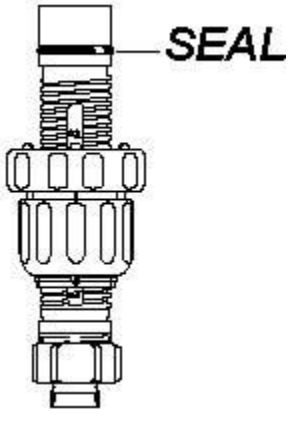
B. Remove the blue bell housing. It is **hand tightened only** and is equipped with a large diameter 'O' ring to prevent leakage.

C. Lift out the piston and reversing mechanism. Occasionally the piston unit will lift off with the bell housing. Care must be taken not to drop it.

Clean and rinse the Filter in clear water. If it is hard to clean, use a toothbrush to gently brush the inside of the filter while running it under warm water. If the filter still does not come clean, soak it in warm water for several minutes and repeat the cleaning procedure.

If you find that the filter on the Hydraulic Injector(s) is often clogged, you can install filter screens with finer mesh. The Snuffer comes standard with a 100-mesh filter, but 200 mesh are available. The finer the mesh, the longer the purge periods must be in order to keep the self cleaning filters clean.

HAND TIGHTEN ONLY. If any leakage occurs, check the 'O' rings for placement or damage.



NOTE: It is recommended that you periodically dismantle the entire Injector, thoroughly rinse it with water and re-assemble after having lubricated the seal with a silicone lubricant.

Any air leakage, impurity or a seal failure can interrupt the injecting function. Periodically check that all of the seals are clean and in good shape.

To Re-assemble the Injector:

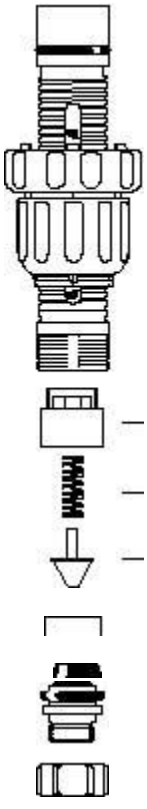
Before re-assembly ensure that the Filter Supports and Bell Housing "O" Ring Seal are clean and free of foreign bodies, then proceed in reverse order to the above.

** Important in all cases tightening must only be done by hand**

Changing seals in the injector assembly (white part) **Important use NO TOOLS, hand tighten only**

Piston Plunger Seal

A. Relieve the pressure system by opening the discharge valves, then unscrew the Bell Housing by hand and remove.
B. Remove the Piston Assembly (holding it upright).
C. Remove the Seal.



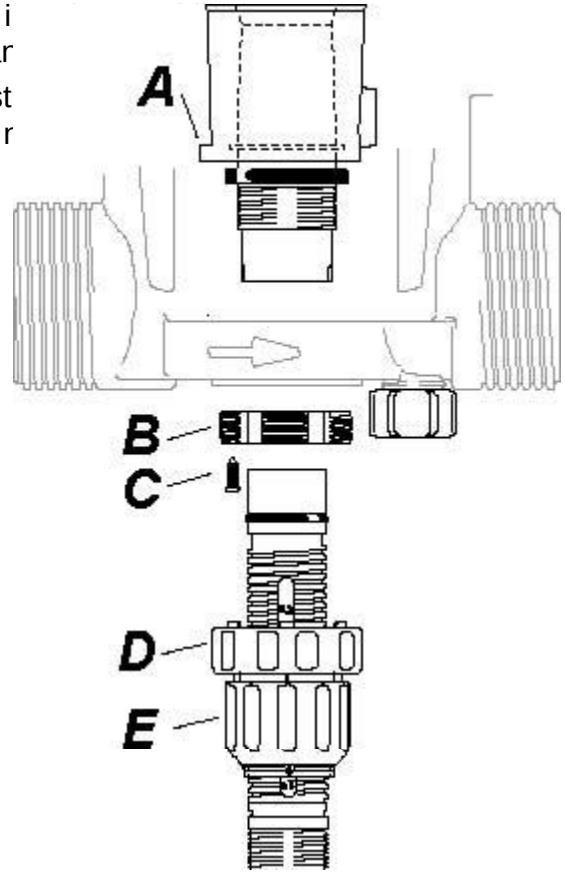
Cleaning and re-assembling of the Injector Chemical Suction Valve:

Unscrew the Plastic Nut marked as "8" and pull downward to release the Check Valve.

Rinse thoroughly the different parts, 2 to 7, with clear water and re-assemble as indicated.

IMPORTANT NOTES:

Any time the Injector is completely disassembled, upon reassemble the Notch (A) in the upper portion of the diffuser is placed over the peg in the bottom housing of the injector. This way, the chemical flow injection port is on the outlet side of the Injector. Screw the jam nut (B) onto the diffuser until the nut jams against the housing, screw in the retaining screw (C) i hole in the jam screw. Insert the stem into the diffuser ar turn the lock nut (D) onto the jam nut and tighten. To adjust simply loosen the lock nut slightly and turn the adjustment r stem move up or down, then retighten lock nut.



If for any reason the entire injector is removed from the Snuffer, make sure the injector is reinstalled with the arrow on the underside of the injector body pointing in the direction of water flow.

Hydraulic Injector Foot Valve & Screen

Periodically remove the hose and foot valve from the bottom of the hydraulic injector stem, wash in soap and water. Remove the stainless steel screen by pulling it off of the foot valve assembly, clean the screen with a suitable brush and reassemble. Check the hose clamps for tightness and the hose for any nicks or cuts or severe crimps in the line. Check the 90-degree elbow to make sure it's tightly screwed into the quick connector.

Air System (Including Air Compressor)

Operation

The compressors are pressure lubricated for side hill operation and water-cooled for long life. A multi-groove serpentine belt drives the compressor to an electric clutch operated pulley on the compressor. When the pressure in the air system is low the hi/low pressure switch cuts in engaging the electric clutch. When the pressure builds up to approximately 5-10 psi above maximum operating pressure, the hi/low pressure switch cuts out (hand line nozzle shut off). When the nozzle valve is open the pressure drops in the system and general CAFS foam delivery pressures are some 40-80 psi depending on length of hose lay and tip size.

NOTE: Higher CAFS foam pressures deteriorate foam quality somewhat

1 Air compressor oil level should be checked frequently. Only the manufacturer's specific synthetic oil should be used, no substitutions are recommended.
2 Check belt tensions. The traction belt on the compressor is held under tension by a fixed mechanical tightener.
3 Check all airlines for deterioration.
4 The amount of moisture in the air will determine how often the air tanks drain valve should be opened and the moisture drained out. If moisture is found in the air tanks then the drain valve in the compressor head should also be opened and the water drained out. Excessive water and any foam in the air tank indicates a faulty air check valve, this should be replaced.

Drain the water from the air tank after each use or at regular intervals as determined by the operator, by opening the drain cock (valve) located at the bottom of the air tank. Make sure to close the valve as soon as the water stops running as it can be easily over looked when responding to a fire call. (DO NOT OVER TIGHTEN).

NOTE: Air pressure in the system must be fully discharged.

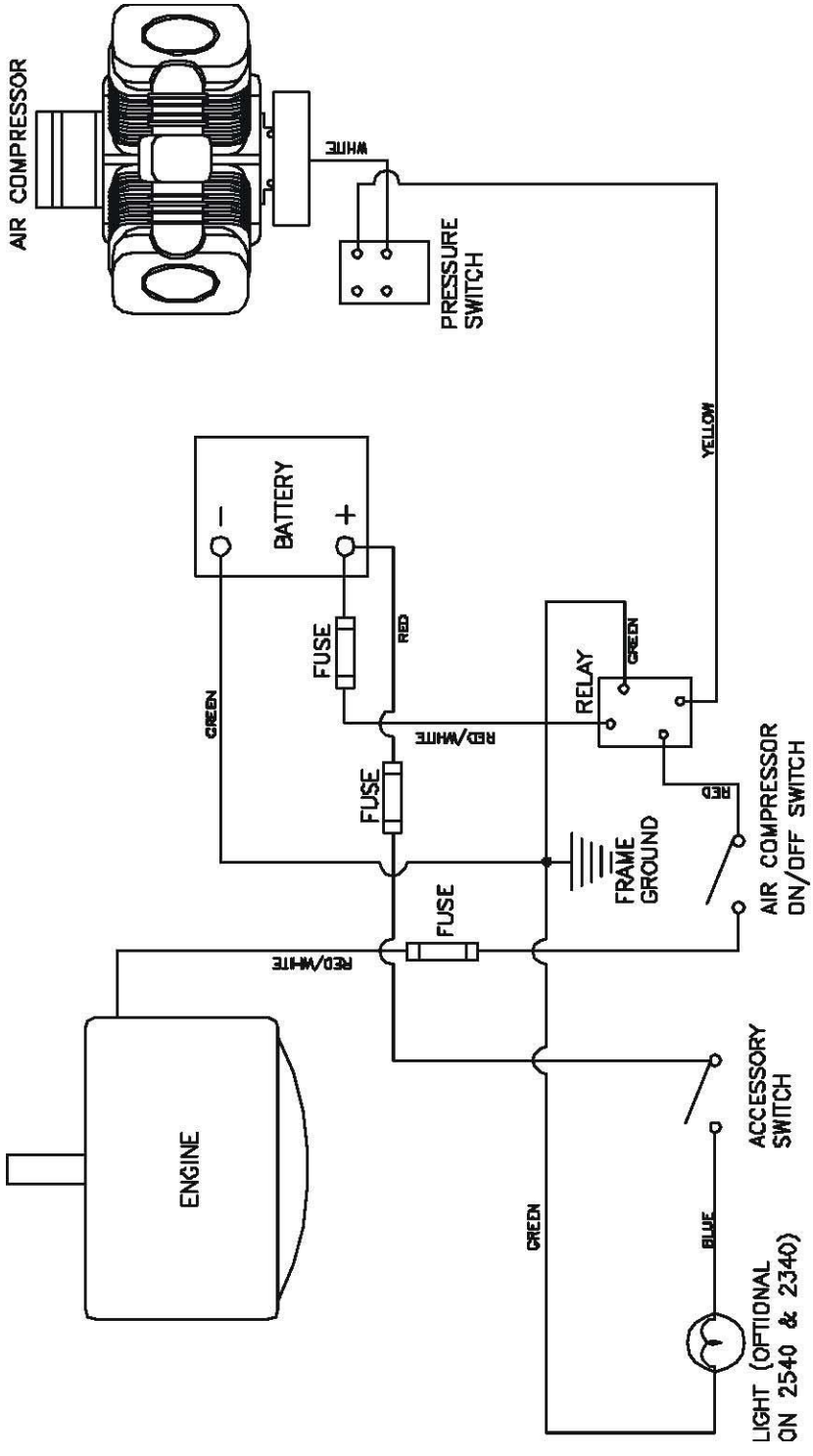
Engine

Engine maintenance

Refer to engine manufacturer's service manual for operation and maintenance.

Electrical System

This is a 12-volt system. The diesel engine has a 32-amp output. The systems may be connected to the truck battery or to a separate battery. IF connecting to the truck battery confirm that the systems are compatible.



The Snuffer Corporation Product Specification Model 45-90

Compressed Air Foam System

Performance

Pump output Rated capacity 90 gpm @ 100 psi Maximum pressure 120 psi

CAFS output 1 – 1-½" (38 mm) outlet Rated capacity 360 gpm @ foam delivery pressure

Water output 1 – 1-½" (38 mm) outlet Rated capacity 90 gpm @ 100 psi (not operating CAFS line) 45 gpm @ 100 psi (while operating CAFS line)

General Specifications - Standard

Frame construction		Welded steel Powder Coated, Stainless steel front panel 1-½" (38 mm) Sched 40 black iron pipe Air outlet with Air/Water separator Air cooler circuit Front panel light bar for nighttime operation
Finish Plumbing Air system		
Light system		
Engine		
•	Make:	Kohler 2 cylinder, 4 cycle, air cooled 25 HP @ 3600 rpm
•	Type:	
•	Output:	
Water Pump		
•	Make:	ACT-8SD Single stage centrifugal 2.00 x 1.50 npt
•	Type:	
•	Inlet x Outlet:	
Compressor		
•	Make:	Stellar 4 cylinder, water cooled, pressure lubricated 42 cfm @ foam delivery pressures 120 psi
•	Type:	
•	Output:	
•	Maximum pressure:	
Foam Injector		
•	Type:	Water driven hydraulic, Automatic flow compensating 45 gpm 120 psi 0.2-2.0% Standard
•	Capacity:	
•	Maximum pressure:	
•	Application rate:	

Dimensions

Depth	33 in	(839 mm)
Width	48 in	(1220 mm)
Height	31 in	(788 mm)
Weight (est.)	450 lbs	(205 kg)

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Weight (est.)	450 lbs	(205 kg)

The Snuffer Corporation
Product Specification
Model 45-90

- Foam concentrate storage (minimum of 2-20 litre pails).
- Fuel supply.

Optional Features

- Rail mount skid system with 250 to 350 US gallon (Fibreglass, Plastic and Aluminium tanks available).
- Roll out capacity for easy servicing.
- Heated enclosure for cold weather operation.
- Plumbing assembly for Drafting and/or Tank operation.
- Hydrant Fill Assembly.
- External Draft (when mounted with water tank).
- Hydro-45, Aspirated foam outlet Rated Capacity 80-800 gpm (of foam).
- Stainless Steel Plumbing with Stainless Steel valves.
- Stainless steel plumbing with Akron valves.
- Foam injector (1.0-5.0% application rate).

Depth	33 in	(839 mm)
Width	48 in	(1220 mm)
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The Snuffer Corporation
Product Specification
Model 45-90

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Height	31 in	(788 mm)
Weight (est.)	450 lbs	(205 kg)

The Snuffer Corporation
Product Specification
Model 45-90

50 gpm @ 100 psi (while operating CAFS line)

Compressed Air Foam System

General Specifications - Standard

Frame construction		Welded steel Powder Coated, Stainless steel front panel 1-½" (38 mm) Sched 40 black iron pipe Air outlet with Air/Water separator Air Cooler circuit Front panel light bar for nighttime operation
Finish Plumbing Air system		
Light system		
Engine		
•	Make:	Kohler 2 cylinder, 4 cycle, air cooled 27 HP @ 3600 rpm
•	Type:	
•	Output:	
Water Pump		
•	Make:	ACE High Performance centrifugal 2.00 x 1.50 npt
•	Type:	
•	Inlet x Outlet:	
Compressor		
•	Make:	Stellar 4 cylinder, water cooled, pressure lubricated 42 cfm @ foam delivery pressures 120 psi
•	Type:	
•	Output:	
•	Maximum pressure:	
Foam Injectors (2)		
•	Type:	Water driven hydraulic, Automatic flow compensating 45 gpm 120 psi 0.2-2.0% Standard
•	Capacity:	
•	Maximum pressure:	
•	Application rate:	

Dimensions

Depth	33 in	(839 mm)
Width	48 in	(1220 mm)
Height	31 in	(788 mm)
Weight (est.)	450 lbs	(205 kg)

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Weight (est.)	450 lbs	(205 kg)

The Snuffer Corporation
Product Specification
Model 45-90
Compressed Air Foam System

- Foam concentrate storage (minimum of 2-20 litre pails).
- Fuel supply.
- Heated enclosure for cold weather operation.

Optional Features

- Rail mount skid system with 250 to 350 US gallon (Fibreglass, Plastic and Aluminium tanks available).
- Roll out capacity for easy servicing.
- Plumbing assembly for Drafting and/or Tank operation.
- Hydrant Fill
- Stainless Steel Plumbing with Stainless Steel valves.
- Stainless Steel Plumbing with Akron valves.
- Foam Injector (1.0-5.0% application rate).

Specification Guide Hydraulic

Injector (s) (water driven)

Water driven Operating Flow Range 2.2 to 50 gpm Operating Pressure 5 to 120 psi Adjustment Ratio 0.2% to 2.0% (adjustable while operating) Filter Plumbing Size 1.50" (38mm) Diameter Mount Bayonet type Chemical Suction Intake Tube 0.50" (13mm) Diameter Purge Hose 0.25" (6.5mm) Diameter Foot Valve Comes with Removable Strainer Switch Control "Off"; "Purge" and "On" Positions

45-90/N Kohler 25 hp Gasoline Engine

The Kohler 25 hp (@3600 rpm) is a 4 cycle, 2 cylinder air cooled gasoline engine.

45-130/N Kohler 27 hp Gasoline Engine

The Kohler 27 hp (@3600 rpm) is a 4 cycle, 2 cylinder air cooled gasoline engine.

45-90/N Monarch 90 gpm Water pump

The single stage centrifugal pump used on all models produces 90 gpm @ 100 psi.

45-130/N ACE 125 gpm Water pump

The single stage centrifugal pump used on all models produces 125 gpm @ 100 psi.

American Eagle 42 CFM Air Compressor

The Air Compressor is a single stage; liquid cooled, 4-cylinder, pressure lubricated unit, with a delivery rate of approximately 42 cfm at foam delivery pressures.

132 cu. in. displacement Maximum working pressure, 155 psi Single stage

Trouble Shooting Guide

1. WATER PUMP

A) Problem: Failure to pump Probable Cause Corrective Action

Pump not properly primed Check that pump and suction hose are full of water. Ensure that suction line fitting are tight, and not leaking. See priming instructions.

Speed to low Check RPM of engine.
Excessive suction lift Locate the Snuffer system closer to water source.

B) Problem: Reduced capacity and/or head, pressure gauge fluctuates. Probable Cause Corrective Action

Air leak in suction hose	Check suction hose fitting and suction strainer. Make sure that suction hose does not arc above the level of the pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer submerged.
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

C) Problem: Pump loses prime Probable Cause

Air leak in suction line Check suction hose fitting and suction strainer. Make sure that suction hose does not arc above the level of the pump.

Excessive suction lift Locate the Snuffer system closer to water source.
Water pressure drops while pumping Check water supply.

D) Problem: Mechanical trouble and noises Probable Cause Corrective Action

Air leak in suction hose	Check suction hose fitting and suction strainer. Make sure that suction hose does not arc above the level of the pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer submerged.
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

C) Problem: Pump loses prime Probable Cause

Bent shaft and/or damaged bearing on pump Misalignment concentricity	Inspect shaft and bearing. Replace if needed. Check alignment of shaft for parallelism. Replace if needed.
Seal leaking due to corrosion of sealing Faces Impeller out of balance	Replace seal. Inspect impeller, remove any debris and

Trouble Shooting Guide

2. ENGINE

A) Problem: Engine turns over but does not start Probable Cause Corrective Action

Air leak in suction hose	Check suction hose fitting and suction strain that suction hose does not arc above the lev pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

C) Problem: Pump loses prime Probable Cause

Bent shaft and/or damaged bearing on pump Misalignment concentricity	Inspect shaft and bearing. Replace if neec alignment of shaft for parallelism. Replace
Seal leaking due to corrosion of sealing Faces Impeller out of balance	Replace seal. Inspect impeller, remove an
Cavitating (rattling noise), pressure gauge fluctuating Over tightening of pump belt	rebalance. Make sure suction strainer on s is in water. Loosen belt (should be ¼" to 3

E) Problem: Lack of water pressure

Probable Cause	***Corrective Action***
Lack of water pressure	Check water in tank. Check water intake li leaks. Check self-cleaning water filter screen.
No fuel or contaminated fuel Fuel line not connected properly Fuel line cracked or crimped Diesel fuel return line crimped Not enough oil in crank case Air filter dirty	Fill fuel tank with clean fuel. connect fuel line. Replace line. Replace line. Check level, and if needed. Clean filter.

B) Problem: Low oil pressure

Probable Cause	***Corrective Action***
Low oil level Loose pipe plug on oil pump cover Worn or defective oil pump	Add recommended oil Tighten plug. Replace or repair as needed.

Dirty air filter Clean air filter.

C) Problem: No oil pressure

Probable Cause	***Corrective Action***

Trouble Shooting Guide

3. Air Compressor

A) Problem: Air Compressor will not engage Probable Cause Corrective Action

Blown fuse Replace fuse. Clutch wire not connected Reconnect wire (check wiring diagram). Defective clutch Repair or replace clutch. Loose belt Tighten belt. Defective belt Replace belt. Defective Hi/Low pressure switch Replace switch. Defective Compressor “ON/OFF” switch Replace switch.

B) Problem: Air Compressor engages, but does not pressurize tank or run up to speed Probable Cause Corrective Action

Air leak in plumbing Repair or replace faulty fitting and/or lines. O-Rings or valve plates Clean valve plates, Replace if cleaning does not correct. Defective check valve Replace check valve. Worn piston Check service manual for specifications. Loose belt Tighten belt. Drain cock on air tank is open Close drain cock.

C) Problem: Air Compressor does not recover pressure as fast as it should Probable Cause Corrective Action

Air leak in suction hose	Check suction hose fitting and suction strainer. Make su that suction hose does not arc above the level of the pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer submerged
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

Leaking drain Tighten and add synthetic air compressor oil Loose pipe plug on oil pump Tighten plug. Worn or defective seals Replace seals, and add synthetic air compressor oil. Standard engine oil was used Drain compressor, replace with synthetic air compressor oil

E) Problem: Compressor does not move air Probable Cause Corrective Action

Defective belt Replace belt. Defective Unloader control Repair or replace Control as needed. Hi/Low pressure switch not engaging Repair or replace as needed.

Trouble Shooting Guide

4. Chemical injectors

Air leak in suction hose	Check suction hose fitting and suction strainer. Make sure that suction hose does not arc above the level of the pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer submerged.
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

C) Problem: Pump loses prime
Probable Cause

Bent shaft and/or damaged bearing on pump Misalignment concentricity	Inspect shaft and bearing. Replace if needed. Check alignment of shaft for parallelism. Replace if needed.
Plugged foot screen Clean screen.	
Quick coupler on stem is leaking. Tighten 90° elbow into connector. Check seal in quick connector.	
Seal leaking due to corrosion of sealing	

Note: If the injector clicks more then 36 times in 15 seconds, you are exceeding 50 gpm. You must make sure that the flow restrictor is in place. Also make sure that the system pressure does not exceed 125 psi.

C) Problem: Back flow into chemical concentrate tank
Probable Cause Corrective Action

Worn or dirty check valves Clean or replace check valves. Seal at bottom of stem is leaking Replace seal.

D) Problem: Difficult and/or no chemical suction Probable Cause Corrective Action

Air leak in suction hose	Check suction hose fitting and suction strainer. Make sure that suction hose does not arc above the level of the pump.
Clogged impeller, suction hose or strainer/foot valve.	Remove and clean.
Insufficient submergence of suction Strainer.	Add lengths of suction hose to keep strainer submerged.
Excessively worn impeller	Replace impeller.
Worn or damaged pump seal	Replace seal.

C) Problem: Pump loses prime
Probable Cause

Bent shaft and/or damaged bearing on pump Misalignment concentricity	Inspect shaft and bearing. Replace if needed. Check alignment of shaft for parallelism. Replace if needed.
Seal leaking due to corrosion of sealing Faces Impeller out of balance	Replace seal. Inspect impeller, remove any debris and rebalance. Make sure suction strainer on suction hose is in water. Loosen belt (should be ¼” to 3/8” play)
Cavitating (rattling noise), pressure gauge fluctuating Over tightening of pump belt	

SNUFFER 4000 Series C.A.F.S.

Single line Compressed Air Foam Systems

Snuffer 4000 Series systems are U.L.C. listed.

Model 2540 Models 45-90, 45-130 Stand Alone System Stand Alone Systems

Snuffer 8000 Series C.A.F.S Doulbe line Compressed Air Foam Systems

Model 8500-HD Model 8900 Hydraulic Drive System Stand Alone System

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